



REACTOR is an ESF-funded scientific programme for the promotion and interchange of research results in the areas of non-linear chemistry and non-linear science. The main emphasis is on the development of fundamental understanding at the molecular level of the processes leading to the formation of spatiotemporal structure and patterns in chemical and biochemical systems.

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Information and News

Steve Scott, who has chaired the REACTOR Programme during its first three years, is stepping down because of pressure of work and will be replaced by Zoltán Noszticzius for the remaining two years of the Programme.

The last ESF REACTOR workshop "Nonlinear phenomena in chemistry", took place in Budapest, 24-26 January 2003. The lists of talks and presentation slides can be found in http://www.phy.bme.hu/deps/chem_ph/Etc/Reactor2003/reactor2003.html.

Meetings

The next REACTOR Meeting is scheduled for the first two weeks of September 2004 in Prague.

GRC Atmospheric Chemistry, September 7-12, 2003,
<http://www.grc.org/programs/2003/atmchem.htm>.

Semester in Trieste on Dynamical Systems and Control Theory, ICTP-SISSA, Italy, Sept. 8 - Dec. 7, 2003. www.sissa.it/fa/am/DCS2003/DCS2003.html.

Grants and Positions

One Postdoctoral position and one PhD position in Control of Complex Dynamical Systems will be available at the Department of Mechanical and Industrial Engineering of Concordia University, Montréal, Québec, Canada. The PhD position can start as a Masters in Mechanical, Industrial or Aerospace but it is a requirement that the candidate

intends to pursue the PhD program. Control applications to systems in the aeronautics and automotive industries are not only possible but also highly encouraged. Concordia University is located in Montréal, a lovely, charming and unique city with a mix of French, English and American cultural environments. Montréal is the capital of the Aeronautical industries in

Canada. Concordia has tight connections with industry, having an Institute for Aerospace Design and Innovation. Industrial partners in that institute range from Pratt and Whitney to Bombardier, Bell Helicopter, CAE, CMC and others. For more information, please see <http://ciadi.concordia.ca>. Research information about the Department can be found at <http://www.me.concordia.ca/html/research.htm>. The starting date for the programs is September 2003 but it is possible and desirable that the candidates start their research during the summer (anytime from June 2003 to September 2003).

The applicants are expected to conduct research on novel control analysis and/or synthesis techniques for several classes of complex dynamical systems, namely, hybrid systems, strongly nonlinear systems and piecewise-affine systems. There is a particular interest in applications of these techniques to the fields of vehicle dynamics, aeronautical systems, control of complex fluid phenomena, control of biological systems (e.g. human speech), optimal control of nonlinear dynamical systems, control of ensembles of autonomous vehicles and distributed control.

The Postdoctoral Fellow position is for a fixed term of one year with strong possibility of renewal for a second year. The successful applicant would be expected to have finished or to be about to complete a PhD in a relevant discipline of Engineering, Computer Science, Physics or Applied Mathematics, with previous experience on Control Theory with applications to nonlinear systems. Good knowledge on at least two of the areas - Physical Modeling, Convex Optimization, Stochastic Control, Signal Processing - and good programming skills (C++, Matlab, Simulink, MEX files, real time operating systems) would be a plus.

The successful PhD applicant should have at least a Bachelor in a relevant discipline of Engineering, Computer Science, Physics or Applied Mathematics, with previous experience on Analysis of Dynamical Systems and/or Control Synthesis Techniques, with an outstanding record of grades in the relevant areas for the research. A Master in one of these areas would be a plus.

Anyone interested in more details should send a detailed cv, list of publications and three contact references to Professor Luis Rodrigues to the email address luisrod@me.concordia.ca,

fax number (514)8484524 or by regular mail to:

Prof. Luis Rodrigues
Department of Mechanical and Industrial Engineering, B-304
Concordia University
1455 de Maisonneuve Boulevard West
Montréal, Québec
H3G 1M8

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Type Engineering Sciences and France

That's it :

Experimental study of interfacial instabilities between miscible fluids, chemical reaction front, suspension and fluidized

(contract number HPMT-CT-2000-00207)

Please feel free to contact me to define more precisely a project.

SALIN Dominique
Laboratoire F.A.S.T
Batiment 502
Campus Universitaire
91405 ORSAY CEDEX, France
tel 33 1 69 15 80 38 lab 33 1 69 15 80 90
fax 33 1 69 15 80 60
email: dos@fast.u-psud.fr
<http://www.fast.u-psud.fr/~dos>

Within the framework of the Marie Curie Host Fellowship program of the EU, the Doctoral School "Nonlinear Phenomena and Statistical Mechanics" of the University of Brussels invites applications for stays between 3 months and 1 academic year from young scientists engaged in a Ph.D. thesis in this general subject area. Eligible candidates should have a University diploma in science or engineering, and be non-Belgian nationals of European Union or of an associated state.

The Doctoral School "Nonlinear Phenomena and Statistical Mechanics" is active in

pluridisciplinary advanced scientific research and training in the fields of nonlinear science, nonequilibrium statistical mechanics and thermodynamics, chemical physics, plasma, fluid and atmospheric physics, nonlinear optics, theoretical biology and ecoethology, mechanics and applied mathematics, and computational science. It has developed internationally recognized expertise in chaos and dynamical systems as applied to statistical mechanics, fluctuations in nonequilibrium states in chemistry and fluid mechanics, microscopic simulation, bifurcation and perturbation theories, and the modeling of complex dynamical phenomena in reaction-diffusion systems including surface catalysis, lasers, biochemical, cellular and population

systems (see also <http://www.ulb.ac.be/cenoliw3/>).

Interested candidates are invited to submit an application including undergraduate records, one letter of recommendation and a letter describing their scientific interests, or to contact directly Professor G. Nicolis (gnicolis@ulb.ac.be). The recruitment will be carried out on an equal opportunity basis.

Prof. G. Nicolis
Center for Nonlinear Phenomena and Complex Systems
CP231, Université Libre de Bruxelles
Campus Plaine
1050 Brussels
Belgium

Publications

J. Yang, A. D'Onofrio, S. Kalliadasis, and A. De Wit, *J. Chem. Phys.*, 117, 9395 (2002).

"We consider the buoyancy driven Rayleigh–Taylor instability of reaction-diffusion acidity fronts in a vertical Hele–Shaw cell using the chlorite–tetrathionate (CT) reaction as a model system. The acid autocatalysis of the CT reaction coupled to molecular diffusion yields isothermal planar reaction-diffusion fronts separating the two miscible reactants and products solutions. The reaction is triggered at the top of the Hele–Shaw cell and the resulting front propagates downwards, invading the fresh reactants, leaving the product of the reaction behind it. The density of the product solution is higher than that of the reactant solution, and hence a hydrodynamic instability develops due to unfavourable density stratification. We examine the linear stability of the isothermal travelling wavefront with respect to disturbances in the spanwise direction and demonstrate the existence of a preferred wavelength for the developed fingering instability. Our linear stability analysis is in excellent agreement with two-dimensional numerical simulations of the fully nonlinear system."

REACTOR Web sites:

http://www.chem.leeds.ac.uk/People/SKS/esf_reactor/esf_reactor.htm

<http://www.esf.org/reactor/>

<http://www.esf.org>

Reactor Steering Committee members:

Stephen K. Scott (Chairman 2000-2002) S.K.Scott@chem.leeds.ac.uk

Anne De Wit (Belgium) adewit@ulb.ac.be

Milos Marek (Czech Republic) marek@tiger.vscht.cz

Lars Olsen (Denmark) lfo@dou.dk

Tapio Ala-Nissila (Finland) Tapio.Ala-Nissila@hut.fi

Freideman Schneider (Germany) fws@phys-chemie.uni-wuerzburg.de

Dirk Poppe (Germany) d.poppe@fz-juelich.de

Zoltán Noszticzius (Hungary, Chairman 2003-2004) nosztzi@phy.bme.hu

Maria Liria Turco Liveri (Italy) tliveri@unipa.it

Rui Dilão (Portugal) rui@sd.ist.utl.pt
John Merkin (*United Kingdom*) amtjhm@maths.leeds.ac.uk

Programme and Network Administrator:

Pat Cosgrove (ESF) pcosgrove@esf.org

ESF Scientific Secretary:

Svenje Mehlert (ESF)

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Submission of News, Information, Meetings, Grants and Publication Abstracts must be sent by e-mail to newsreactor@sd.ist.utl.pt. The received information will be included in the next REACTOR Newsletter. Everyone is encouraged to pass this information to other colleagues outside the REACTOR network.

Previous Newsletters are posted in the REACTOR web sites.
